

WHAT IS CLAIMED IS:

1. A power supply for an auxiliary power unit of a vehicle having a combustion engine which drives an electric generator, said power supply comprising:

a fuel cell having a hydrogen input, an oxygen input and an exhaust output;

an electrolyzer for generating hydrogen and oxygen from water, using electricity generated by said electric generator when said combustion engine is running;

a hydrogen storage device connected to the electrolyzer for storing hydrogen produced by the electrolyzer, and connected to supply hydrogen to the fuel cell;

a water supply for supplying water to the electrolyzer; and

a pressure pump for adjusting the pressure between the water supply and the electrolyzer.

2. A power supply according to Claim 1, wherein the auxiliary power unit further comprises one of a dc/dc-converter, an ac/dc-converter and an electric control for supplying electric

energy to one of electric loads and an electric storage means of the vehicle when the engine is inoperative.

3. A power supply according to Claim 1, wherein the electrolyzer comprises a reversible fuel cell, which is operable in both an electrolyzer mode and a fuel cell mode.

4. A power supply according to Claim 1, wherein the water supply comprises a condenser for separating water from a fuel cell exhaust.

5. A power supply according to Claim 1, wherein the water supply comprises one of a water buffer tank and a vehicle water tank for separating water from a fuel cell exhaust.

6. A power supply according to Claim 1, wherein the electrolyzer is a high pressure electrolyzer operated at a pressure above 100 bar.

7. A power supply according to Claim 1, wherein the hydrogen storage tank is a high pressure storage tank operated at a pressure of approximately 400 bar.

8. A power supply according to Claim 5, further comprising a purification device disposed between the water buffer tank and the electrolyzer.

9. A power supply according to Claim 1, wherein the electrolyzer further comprises an oxygen storage tank.

10. A power supply according to Claim 1, further comprising a compressor arranged between said electrolyzer and said hydrogen storage.

11. A method for operating a power supply for an auxiliary power unit of a vehicle having a combustion engine that drives an electric generator, which power supply has a fuel cell with a hydrogen input, an oxygen input and an exhaust output; an electrolyzer for generating hydrogen and oxygen from water; a hydrogen storage device connected to the electrolyzer for storing hydrogen produced by the electrolyzer, and connected to supply hydrogen to the fuel cell; a water supply for supplying water to the electrolyzer; a pressure pump for adjusting the pressure between the water supply and the electrolyzer, said method comprising:

said electrolyzer using electricity generated by said electric generator to produce hydrogen while the vehicle's engine is operative;

storing produced hydrogen in a high pressure storage; and

feeding said hydrogen to said fuel cell for producing electric power while the engine is inoperative.

12. A Method according to Claim 10, wherein the hydrogen is stored in a hydrogen storage tank at a pressure of approximately 400 bar.

13. A Method according to Claim 10, wherein water is fed to the electrolyzer by one of collecting water from the fuel cell exhaust and by collecting water from the combustion engine's exhaust.

14. A vehicle comprising:

an electric generator;

a combustion engine which drives said electric generator;

and

an auxiliary power unit which includes

a fuel cell having a hydrogen input, an oxygen input and an exhaust output;

an electrolyzer for generating hydrogen and oxygen from water, using electricity generated by said electric generator when said engine is running;

a hydrogen storage device connected to the electrolyzer for storing hydrogen produced by the electrolyzer, and connected to supply hydrogen to the fuel cell;

a water supply for supplying water to the electrolyzer;  
and

a pressure pump for adjusting the pressure between the water supply and the electrolyzer.